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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09-470,343	12 22 1999	Bernardo Martinez-Tovar	P-1583	6032

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EXAMINER

CHAMBERS, TROY

ART UNIT	PAPER NUMBER
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3641

DATE MAILED: 08 04 2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/470,343

Applicant(s)

MARTINEZ-TOVAR ET AL.

Examiner

Troy Chambers

Art Unit

3641

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-24 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s) ____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____ 6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

- (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
- (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-7, 9 and 11-24 are rejected under 35 U.S.C. 102(b) as being anticipated by PCT Publication WO 9742462 issued to Martinez-Tovar ("MT"). MT discloses a semiconductor bridge device 10, comprising: a silicon or sapphire substrate 12 (pg. 11, ll. 29-30); an electrical bridge structure disposed on the substrate 12 (fig. 1), the bridge structure comprising a layer of semiconductor material; a layer consisting essentially of titanium 18, 20 (pg. 11); the bridge structure comprising a bridge section 14c extending between pad sections 14a/b; a pair of aluminum lands 16a/b (pg. 9, ll. 13-36); a pair of electrical leads 32 a/b; and, a capacitor connected to said leads 32 a/b (pg. 24, ll. 24-29).

3. Independent claims 1, 12, 18 and 21 are rejected as anticipated by MT as described above.

4. Dependent claims 2, 3, 4, 15, 16, 17 and 20 are rejected as anticipated by MT as described above.

5. With respect to claim 5, MT discloses a substrate comprises silicon with a silicon dioxide layer (pg. 8, ll. 16-21).

6. With respect to claim 6, MT discloses a substrate comprising sapphire (pg. 8, ll. 24-27).

7. With respect to claims 7, 9 and 19, MT discloses a semiconductor bridge wherein the material having a negative coefficient of electrical conductivity comprises polycrystalline silicon (claim 18).
8. With respect to claim 15, MT discloses an igniter in contact with an energetic material charge contained within the header of an igniter assembly (fig. 3b and claim 15).
9. With respect to claims 22-24, refer to MT claim 14 and pages 23-26.
10. Claims 21-23 rejected under 35 U.S.C. 102(b) as being anticipated by Benson. Benson discloses an SCB igniter comprising: a substrate, a bridge comprising a layer of semiconductor material and having thereover a layer of solid metal, a bridge section extending between and connecting spaced-apart pad sections and lead wires connected to said lands capable of accepting a voltage sufficient to melt the solid metal.
1. Claims 1-3, 5, 7, 11, and 18-20 are rejected under 35 U.S.C. 102(a) as being anticipated by DE 19732380 issued to Weiss. Weiss discloses a thin film igniter, comprising: a substrate 4; a silicon dioxide layer 3 disposed on said substrate; a titanium hydroxide layer disposed on said silicon dioxide layer; and 2 metal contacts 1 disposed over said titanium layer. See also the abstract and Fig. 4.

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. Claims 8 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over MT or Weiss in view of US Patent No. 4976200 issued to Benson et al. ("Benson"). MT discloses a semiconductor bridge as described above. But, Benson does not disclose a bridge structure comprising a layer of undoped polycrystalline silicon. However, the use of undoped silicon substrates is well known and used by those with ordinary skill in the semiconductor igniter art (see, e.g. U.S. Patent Nos. 4976200, 5309841, 5861570 and SIR H1366).

Specifically, Benson discloses a tungsten bridge for the low energy ignition of explosive and energetic materials wherein the substrate 12 and silicon bridge layer 20 are made of undoped silicon. At the time of the invention, it would have been obvious to one of ordinary skill in the art to substitute the doped silicon layers of MT with undoped silicon as taught by Benson. The suggestion/motivation for doing so would have been to save manufacturing time and costs (Benson, col. 3, ll. 67-67 to col. 4, ll. 1-28).

2. Claims 4, 6, 8, 9 and 11-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over MT in view of Weiss. MT discloses an igniter as described above. However, MT does not disclose a titanium hafnium bridge. Weiss discloses such a bridge. At the time of the invention, one of ordinary skill in the art would have found it obvious to provide the semiconductor bridge igniter of MT with the titanium hafnium bridge of Weiss. The suggestion/motivation for doing so would have been to provide an igniter capable of low energy initiation. (See, Weiss, Abstract).

Double Patenting

13. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed.

Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

14. Claims 1-7, 9 and 11-24 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 3, 4, 5-9, 12-20 and 36 of U.S. Patent No. 6133146 (the US equivalent to the MT disclosure). Although the conflicting claims are not identical, they are not patentably distinct from each other because of the reasons stated above.

15. Claims 1-24 rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 3, 4, 5-9, 12-20 and 36 of U.S. Patent No. 6133146 in view of Benson. See above explanation of obviousness rejection.

Allowable Subject Matter

1. The allowance of claims 1-11, and 18-20 has been withdrawn for the reasons set forth in the Response to Arguments section.

Response to Arguments

1. Applicant amended claims 1 and 18 to include the “consisting essentially of” terminology when describing the limitations of the bridge structure. The phrase “consisting essentially of” is used to limit the scope of the claim to the specified materials or steps “and those that do not materially affect the basic and novel characteristics” of the claimed invention. *In re Herz*, 537

F.2d 549, 551-52, 190 USPQ 461, 463 (CCPA 1976). Applicant sole reason for inserting the “consisting essentially of” phrase to exclude MT as a reference is because the titanium layer (as opposed to the titanium/tungsten layer) “melts well before the silicon vaporizes and the molten titanium does not impede the plasma generated from the silicon bridge from igniting the energetic material.” (See, Response to Office Action, 18 Mar 2003, pg. 3).

A review of the cited prior art of record and additional documents convinced the examiner that the inclusion of tungsten does not “materially affect” the supposed novel characteristics of the claimed device. The applicant describes the alleged “problem” with the prior art device in terms of the melting points of the metal/polysilicon layer. For example, the applicant has asserted that the high melting point of tungsten (3695K) exceeds the vaporization temperature of silicon (2628K) and therefore causes migration of the tungsten material after detonation. It was asserted that titanium addressed this problem because the melting point of titanium (1941K) is lower than the vaporization temperature of silicon.

However, it appears that expressing the “problem” in terms of the melting points of the various elements does not properly describe the detonation event of a semiconductor bridge igniter. For example, while the vaporization temperature of silicon is 2628K, the plasma thermal event that results from the detonation of the device produces a temperature in excess of 5500K. This high temperature would not only vaporize the silicon but would also melt any tungsten components. Support for this position can be found in the Benson reference (disclosing a tungsten semiconductor bridge in which “the intense plasma event vaporizes both the tungsten and the silicon layer of the bridge”; col. 5, ll. 45-46) and the physics letter Characteristics of semiconductor bridge (SCB) plasma generated in a micro-electro-mechanical system (MEMS)

(disclosing plasma discharge temperatures between 4200-5500 K and as high as 5600 K; pg. 1 and 6).

Hence, although the applicant suggests a problem with the inclusion of tungsten in an SCB device, it is clear that no such problem exists and the prior art devices that include tungsten and titanium do not materially affect the alleged novel characteristics of the claimed device.

2. With respect to claim 12, applicant argues: "Accordingly, not only does Martinez-Tovar fail to disclose a semiconductor bridge device with a layer of titanium annealed on the semiconductor material as described in claim 12, it teaches away from such a device." The issue regarding the layer of titanium has been addressed. As for MT "teaching away" from such a device, applicant is reminded that the rejection is under 35 U.S.C 102 and arguments relating to what is taught away are not applicable. MT merely has to disclose the annealing process.

3. With respect to claim 21, applicant refers the disadvantages of not having tungsten included. This issue has been discussed above.

4. With respect to claim 21, applicant states, "Nowhere does Benson teach or suggest melting the metal layer to remove solid metal from between the semiconductor material and the energetic material." However, applicant is directed to col. 5, ll. 45-46 of Benson, which state, "The intense plasma event vaporizes both the tungsten and the silicon layer of the bridge."

5. Attention is also made to applicant's interpretation of claims 1 and 18 in the *Stated Reasons for Allowance of Claims 1-11 and 18-20* section of the Response filed 22 July 2003. In that section the applicant disagrees with the examiner's interpretation of the claims. Specifically, applicant states, "As taught in the specification, this can be achieved by providing a metal layer (such as titanium) that melts at a temperature close to that of the vaporization temperature of the

semiconductor material of the bridge”, and “However, the claim need not exclude metals with melting temperatures around or below that of titanium, because such metals and alloys could be included and still permit the device to operate as it does with a layer of titanium as described above.” The examiner makes 2 observations with respect to these comments. First, the specification is enabled only for the use of titanium. The specification does not provide for metal layers *such as titanium*. The specification provides for metal layers comprising titanium only. Indeed, the title of the invention is titanium semiconductor bridge igniter. Second, applicant’s latter statement is equivalent to an admission and will be used in future prosecution of this application. The finding of equivalence of titanium and all other metals having a melting point at or below titanium is significant. The prior art discloses semiconductor bridges that use at least an aluminum coating over the polysilicon layer.

Conclusion

6. **THIS ACTION IS MADE FINAL.** All cited prior art was either previously used in a rejection or of record. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

16. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The patent to Reynes and the publication to Kim are cited as of interest to show similar semiconductor bridge igniters. Reynes discloses the annealing of polysilicon semiconductor devices to avoid mechanical stresses in the mechanical layer. Kim discloses the high plasma temperatures of a plasma discharge in a semiconductor bridge igniter.

17. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Troy Chambers whose telephone number is (703) 308-5870. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael J. Carone, can be reached at (703) 306-4198.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 306-4177. The fax phone number for the organization where this application or proceeding is assigned is (703) 306-4195.

Charles T. Jordan